

Chapter 2

Command, Control, and Communications

CAS requires a C2 structure that can coordinate requirements, process requests, and control execution. The amphibious tactical air control system (ATACS) is organized and equipped to plan, direct, and control all air operations within an assigned area. The ATACS can also coordinate air operations with the other components of a joint force.

AMPHIBIOUS TACTICAL AIR CONTROL SYSTEM

The subordinate systems of the ATACS are the Navy tactical air control system (NTACS) and the Marine air command and control system (MACCS). Through the control agencies and facilities of the NTACS and MACCS, commanders exercise the necessary C2 of available aviation assets. Figure 2-1 illustrates the necessary connectivity between the key elements, fire support centers, and air C2 agencies of the ATACS. See Navy warfare publication (NWP) 3-09.11, *Supporting Arms in Amphibious Operations*, and MCWP 3-31.1, *Fire Support in Amphibious Operations*, for a detailed discussion of the NTACS. See MCWP 3-25.3, *Marine Air Command and Control System Handbook*, for a detailed discussion of the MACCS. See Joint Pubs 3-02, *Joint Doctrine for Amphibious Operations*; 3-02.1, *Joint Doctrine for Landing Force Operations*; and 3-52, *Doctrine for Joint Airspace Control in the Combat Zone*, for further information concerning air C2 in amphibious operations.

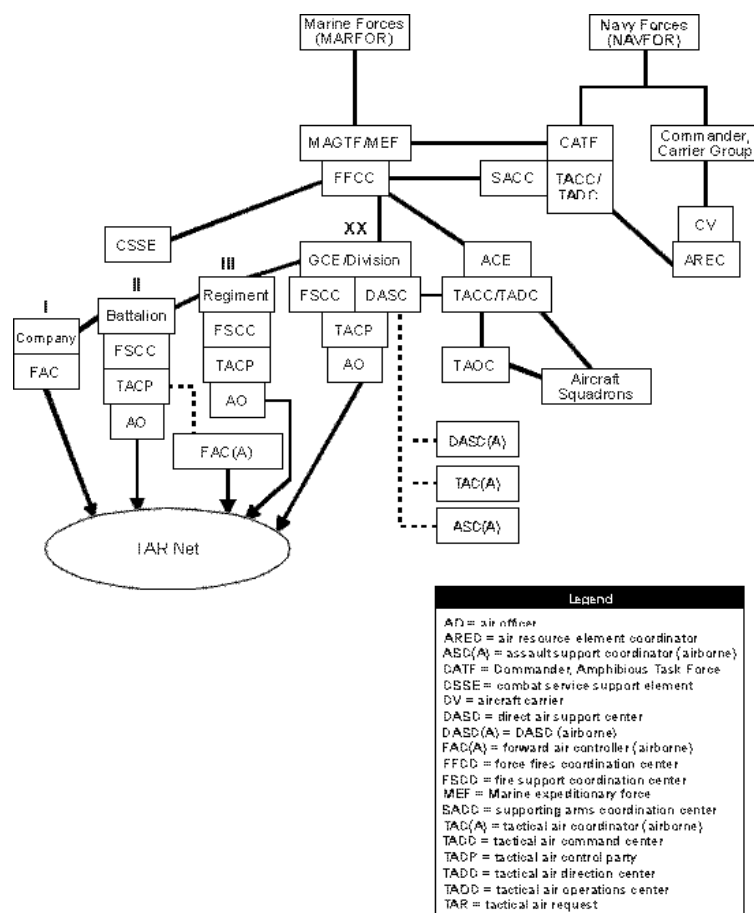


Figure 2-1. Navy/Marine Corps Close Air Support Connectivity.

NAVY TACTICAL AIR CONTROL SYSTEM

The NTACS is the principal air control system afloat. The senior Navy air control agency is the Navy tactical air control center (TACC). When required, a subordinate air control agency, the tactical air direction center (TADC), may be established.

- **Navy TACC/TADC.** The Navy TACC controls all air operations within the amphibious objective area (AOA). The TACC/TADC is responsible for planning and conducting CAS. Typically, the Navy TACC is onboard the amphibious task force (ATF) flagship. If the joint force commander (JFC) designates a seabased joint force air component commander (JFACC), the Navy TACC may host the joint air operations center (JAOC).

If two or more ATACS command-level agencies are operating within an AOA, one agency functions as the TACC and the other(s) functions as the TADC(s). When established, the TADCs are under operational control (OPCON) of the TACC, the TADC exercises only those functions delegated by the TACC. When the Marine TACC is established, the Navy TACC is redesignated a TADC, and other centers become subordinate. The Navy TADC functions in a standby status, prepared to reassume its role as the TACC should the situation dictate.

The Navy TACC has two sections that control and integrate CAS: the air traffic control section (ATCS) and the air support control section (ASCS).

- **ATCS.** The ATCS provides initial safe passage, radar control, and surveillance for CAS aircraft in the AOA. The ATCS can also provide early detection, identification, and warning of enemy aircraft.
- **ASCS.** The ASCS is the section of the TACC designed to coordinate and control overall CAS employment. The primary task of the ASCS is to provide fast reaction to CAS requests from the landing force. The ASCS coordinates with the supporting arms coordination center (SACC) to integrate CAS and other supporting arms; provides tactical air direction of assigned aircraft; provides aircrews with current and complete friendly intelligence, enemy intelligence, and target briefings; passes CAS control to the terminal controller; executes the CAS portion of the air tasking order (ATO); and acts as the action agency for immediate CAS requests.
- **SACC.** Although the SACC is not part of the ATACS, it is integral to amphibious assault supporting arms C2. The SACC processes joint tactical airstrike requests (JTARs) and determines which supporting arm is best suited to engage targets. The SACC maintains radio contact on tactical air request (TAR) nets with tactical air control parties (TACPs) to coordinate CAS requests.

MARINE AIR COMMAND AND CONTROL SYSTEM

The MACCS provides the MAGTF with the means to integrate, coordinate, and control all air operations within its area of operations and with joint/combined forces. The principal agencies of the MACCS concerned with CAS are the Marine TACC/TADC, the

tactical air operations center (TAOC), and the direct air support center (DASC). (See figure 2-1.)

Marine Tactical Air Command Center/ Tactical Air Direction Center

The Marine TACC is the senior MACCS agency and is the focal point for aviation C2. It is the operational command post for the ACE commander. The Marine TACC can host the JAOC when the Marine component provides the JFACC.

The Marine TADC is the senior MACCS agency until the MAGTF assumes control of all air operations. Once the MAGTF assumes control, the TADC is designated the Marine TACC.

Tactical Air Operations Center

The TAOC is subordinate to the Marine TACC. The TAOC provides safe passage, radar control, and surveillance for CAS aircraft en route to and from target areas. See MCWP 3-25.7, *Tactical Air Operations Center Handbook*, for a detailed discussion of the TAOC.

Direct Air Support Center

Typically, this center is the first principal MACCS agency established ashore in an area of operations and is subordinate to the Marine TACC. The DASC can serve as the alternate TACC for a limited period when the TACC echelons forward or becomes a casualty. The DASC coordinates CAS and is normally collocated with the ground combat element's (GCE's) senior fire support coordination center (FSCC). When there are multiple GCEs, the DASC

may be collocated with the MAGTF's force fires coordination center (FFCC). An airborne DASC can be operated from the KC-130 aircraft. The DASC (airborne) (DASC(A)) normally serves as an airborne extension of the DASC, but can be employed as an independent control agency. See MCWP 3-25.5, *Direct Air Support Center Handbook*, for a detailed discussion of the DASC.

- **Tasks.** The DASC processes immediate direct air support requests and coordinates the execution of preplanned and immediate direct air support missions, including CAS. The DASC also coordinates with the senior GCE FSCC to integrate CAS with supporting arms.
- **Supporting Arms Integration.** The link between the DASC and the senior FSCC is critical for the coordination and integration of CAS missions with other supporting arms. The DASC receives current ground and air intelligence information primarily from aircrews operating within the battlespace. Aircrews can pass visual reconnaissance reports that are essential to timely battlefield targeting directly to the DASC, which then passes this information to the Marine TACC/TADC and the senior FSCC. The FSCC uses these visual reconnaissance reports in the assessment phase of the targeting process.

MACCS Terminal Control Agencies

CAS terminal control agencies control the final delivery of ordnance. Terminal control agencies require continuous communications and the ability to track CAS aircraft by visual or electronic means. Some terminal control agencies, such as TACPs, are not organic to the ACE. The MACCS integrates terminal controllers into the C2 system through communications and standard procedures.

- **TACP.** The TACP, which plays an important role in the air C2 system, is responsible for reporting employment and coordination of CAS to the supported ground commander. TACP provides a means for the ground commander to access the MACCS to fulfill his direct air support requirements. TACPs exist at the MAGTF level through the battalion level and are primarily used to integrate and coordinate air support in the fire support process. At the battalion level, the TACP is also used to provide terminal control for CAS aircraft.
- **Organization.** The battalion TACP consists of 3 aviators and 12 radio operators. The senior officer is the air officer (AO), who acts in a dual capacity as special staff officer to the battalion commander for all aviation matters and as the officer in charge of the TACP. Each of the other two aviation officers is a forward air controller (FAC) and the leader of a forward air control party. Each forward air control party has four communicators. Regimental, division, and MAGTF TACPs do not have FACs.
- **Tasks** The TACP participates in fire support coordination. The AO advises the ground unit commander on CAS employment and works in the FSCC as the battalion's air representative. The forward air control parties prepare the majority of the preplanned and immediate requests for CAS and provide the battalion with its CAS terminal control capability.
- **FAC.** The FAC provides terminal control for CAS aircraft and maintains radio communications with assigned CAS aircrews from a forward ground position. FAC terminal control aids in target identification and greatly reduces the potential for fratricide. The duties of the FAC include:
 - Knowing the enemy situation, selected targets, and location of friendly units

- Knowing the supported unit's plans, position, and needs
 - Locating targets of opportunity
 - Advising the supported company commander on proper air employment
 - Requesting CAS
 - Controlling CAS
 - Performing battle damage assessment (BDA).
- **Airborne Controllers and Coordinators.** The airborne MACCS agency that provides airborne terminal control of CAS aircraft is the FAC (airborne) (FAC(A)). The tactical air coordinator (airborne) (TAC(A)) provides coordination for OAS missions. The assault support coordinator (airborne) (ASC(A)) provides coordination of CAS for assault support missions.
 - **FAC(A).** The FAC(A) is an airborne extension of the TACP. The FAC(A) can serve as another FAC for the TACP or augment and extend the acquisition range of a forward air control party. The FAC(A)'s mission is different from the TAC(A)'s mission. The FAC(A) provides terminal control of CAS aircraft, while a TAC(A) aids in the coordination of available supporting arms. FAC(A) and TAC(A) missions should not be conducted simultaneously by the same aircrew. FAC(A) duties include detecting and destroying enemy targets, coordinating or conducting target marking, providing terminal control of CAS missions, conducting air reconnaissance, providing artillery and naval gunfire air spotting, providing radio relay for the TACP and FAC, and performing BDA.

- **TAC(A).** The TAC(A) is an officer operating from an aircraft who coordinates CAS and other supporting arms with ground combat operations while providing airspace coordination. The TAC(A) is an airborne extension of the DASC or Marine TACC/TADC. The DASC or Marine TACC/TADC identifies specific TAC(A) authority. The TAC(A) coordinates with TACPs, FSCCs, subordinate FAC(A)s, artillery units, and naval surface fire support (NSFS) ships. TAC(A) duties include coordinating CAS attack briefs and timing, providing CAS aircraft hand-off to terminal controllers, relaying threat updates and BDAs, coordinating and deconflicting CAS with other supporting arms, and coordinating fixed- and rotary-wing operations.
- **ASC(A).** The ASC(A) operates from an aircraft to provide coordination and procedural control during assault support operations. The ASC(A) is assigned by the ACE commander and plays a critical role during multiple, independent assault support operations or large, complex operations. The ASC(A) is a component of the NTACS/MACCS and is an airborne extension of the DASC or helicopter direction center (HDC). ASC(A) duties include aiding in airspace coordination and integration of assault support operations when DASC/HDC operations are degraded or require augmentation; supporting initial assaults, follow-on assaults, or other assault operations; supporting the air mission commander (AMC) by coordinating movement of aircraft through the C2 system and assigned airspace; and coordinating with the TAC(A) or FAC(A) to provide CAS to the AMC during combat assault transport and other assault support operations.

COMMUNICATIONS

Information exchange by tactical communication means is necessary to facilitate CAS and allow the proper control of CAS events. Communications must be mission-tailored and robust to ensure that links between aircraft and ground units are maintained and to minimize the chance of fratricide and enhance mission effectiveness. Flexibility and responsiveness of CAS communications is made possible by using a variety of techniques, including secure, frequency-agile equipment; appropriate countermeasures; disciplined emission control (EMCON); and standard communications nets.

Secure Voice/Frequency-Agile Communications

The standard mode for all CAS communications should be secure voice, frequency agile (e.g. HAVE QUICK or single-channel ground and airborne radio system (SINCGARS)), and/or data link whenever available. However, the absence of these capabilities should not be allowed to hinder the application of CAS, especially in emergency situations or in the case of a time-sensitive target.

Countermeasures

Enemy communications jamming, monitoring, and imitative deception interfere with the air C2 system and jeopardize the use of CAS. Proper radio procedures are critical. A number of techniques exist to counter jamming and deception. These include natural terrain masking, burn through, brevity, chattermark procedures, frequency-agile radios, secure communications, authentication, and visual signals. No single technique is completely effective by itself. The

tactical environment, available communications equipment, and the mission determine the proper techniques to be used.

Emission Control

EMCON should be emphasized throughout the planning and training cycles. As the enemy increases the use of electronic attack (EA), traditional air support communications may become difficult. This may reduce an aircrew's ability to conduct immediate missions. However, a preplanned mission can be accomplished with minimum communication between the terminal controller and the aircrew. CAS planning should include the identification of alternate communication methods to coordinate, request, and control CAS.

On a preplanned CAS mission with high enemy EA activity, the DASC or TAC(A) can transmit the CAS brief to the aircrew before initial contact with the terminal controller. The aircrew would contact the terminal controller, transmit the abort code, and receive the time on target (TOT) or time to target (TTT). Once this is accomplished, both the controller and the aircrew have the minimum coordinating information required to accomplish the preplanned attack.

Another example is a preplanned, scheduled mission with no direct contact anticipated between the terminal controller and the aircrew. The aircrew uses previously coordinated information, normally from the supported unit's tactical airstrike request, with a TOT to conduct the attack. All participants—aircrew, terminal controller, DASC, FSCC, artillery—must use the same timing method. The best timing method is the synchronized clock. With the proliferation of ground and air global positioning systems (GPSs), the use of GPS time has become more prevalent and is the preferred timing synchronization method. If a synchronized clock is not available, the terminal controller can pass a TTT to the aircrew once they are airborne.

MAGTF Close Air Support Communications Nets

Standard communications nets are used by air control agencies and tactical aircraft in the conduct of CAS. In addition to these standard nets, numerous alternative nets also exist within the C2 systems, and these alternative nets could be used in extreme situations. Alternative nets are designed to provide communications redundancy. See figure 2-2 on page 2-14 for a listing of the standard communications nets associated with CAS.

- **Direct Air Support Net.** This net provides a means for the DASC to request direct air support aircraft from the TACC/TADC. Information pertaining to aircraft status and progress of direct air support missions may also be passed over this net.
- **Group Common Net.** This net provides a means of communication between in-flight group aircraft and/or with the aircraft group headquarters. Each aircraft group has its own common net.
- **Guard Net.** This net is the emergency distress net for aircraft. The guard net further serves as a means for air control agencies to advise aircraft of emergency conditions or serious hazards to flight safety. All aircraft continuously monitor the guard net.
- **Helicopter Direction Net.** This net provides positive control of inbound and outbound helicopters in the AOA. It is a backup net that is available to coordinate rotary-wing CAS.

- **Squadron Common Net.** This net provides a means of communication between squadron aircraft and/or with the squadron headquarters. Each aircraft squadron has its own common net.
- **Tactical Air Command Net.** This net provides the primary means by which the TACC/TADC can task aviation groups and squadrons to conduct direct air support, including CAS.
- **TACP Local Net.** This net provides a means for coordination between the AO and his FACs. Coordination with TAC(A)s and FAC(A)s may also be conducted over this net.
- **Tactical Air Direction (TAD) Net.** This net provides a means for the control of aircraft conducting CAS and for the TACC/TADC/DASC to brief CAS aircraft on target information and assignment to the FAC or FAC(A). Multiple TAD nets are required and used by various air control agencies. This net is primarily ultrahigh frequency (UHF), with a secondary very high frequency (VHF) capability available in some cases. The TAD net should be reserved for time-critical terminal control information only.
- **TAR Net.** This net provides a means for ground maneuver units to request immediate air support from the DASC or TACC/SACC. The SACC/FSCCs monitor this net and may approve, disapprove, or modify specific direct air support requests. The DASC uses the net to brief the requesting unit on the details of the mission. Additionally, BDAs may be passed over the TAR net. Multiple TAR nets may be required depending on the extent of CAS operations. A secondary VHF capability may be available.
- **Tactical Air Traffic Control (TATC) Net.** This net provides a means for the TACC/TADC, TAOC, and DASC to exercise control of all tactical and itinerant aircraft in the area of

operations. Types of information passed over the TATC net include aircraft reports of launches by mission number, clearance of aircraft to their assigned control agencies, diverting aircraft as necessary, and relay of in-flight reports and BDA. Multiple TATC nets are often required.

Net	Frequency	TACC	TADC	TAOC	DASC	Marine Aircraft Group (MAG)	TACP	Aircraft
Direct Air Support	HF VHF	X	#		X			
Group Common	UHF					X		#
Guard	UHF VHF	X	X	X	X		X	X
Squadron Common	UHF VHF							#
Tactical Air Command	HF VHF	X X	# X	X	X	X		
TACP Local	VHF				#		X	#
Tactical Air Direction	UHF VHF	X	#	#	X		#	#
TAR	HF VHF	N	#	#	X		X	
Tactical Air Traffic Control	UHF VHF	X #	#	X	X			#
X = Indicates Normal Participation in the Specified Net. # = Indicates Participation When Directed or as Required. N = Indicates Participation by NTACS Agencies.								

Figure 2-2. MAGTF Close Air Support Communications Nets.

CLOSE AIR SUPPORT COMMAND AND CONTROL FOR JOINT FORCE OPERATIONS

The JFC normally exercises OPCON through Service component commanders, functional component commanders, or some combination of the two. In joint operations, components should provide and operate C2 systems that have similar functions at each level of command. Joint CAS is controlled by the JAOC and uses the host component's organic C2 architecture. If designated, the JFC, through the JFACC, tasks air assets made available for joint tasking through Service component C2 systems. Figure 2-3 illustrates basic joint force CAS connectivity between service components, the JFC, and the JFACC.

In the case of MAGTF aviation in joint operations, the MAGTF commander will retain OPCON of organic air assets. MAGTF air assets will normally be in support of the MAGTF mission. To support the CAS needs of the joint force, sorties in excess of the MAGTF's direct air support requirements will be provided to the JFC for tasking. For further information, see the "Policy for Command and Control of United States Marine Corps (USMC) TA-CAIR in Sustained Operations Ashore," page IV-4, Joint Pub 0-2, *Unified Action Armed Forces (UNAAF)*.

Figure 2-4 (page 2-17) depicts functional equivalents among the U.S. Air Force theater air control system (TACS), U.S. Army air-ground system (AAGS), NTCAS, MACCS, and special operations C2. See Joint Pub 3-56.1, *Command and Control for Joint Air Operations*, for further information.

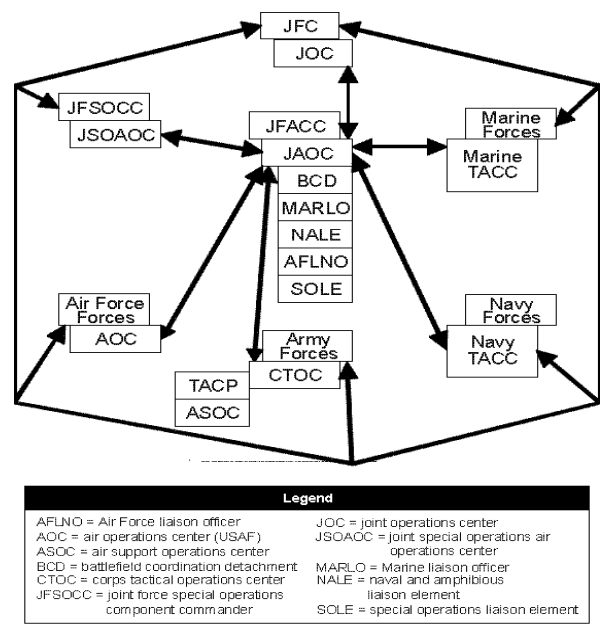


Figure 2-3. Joint Force Close Air Support Connectivity.

During joint force operations, a command relationship between land components (e.g. tactical control (TACON), OPCON, attachment, supporting/supported) may or may not exist.

If a command relationship is established between components, the supporting component uses the CAS process of the supported component. For example, if an Army brigade is under the OPCON of a MAGTF commander, the Army brigade directs CAS requests through the brigade fire support element (FSE) to the Marine FSCC and through the MACCS. The Army request is handled the same as any other CAS request in the MACCS.

If a command relationship is not established between components, each component forwards CAS requests using its respective CAS

U.S. Marine Corps	U.S. Army	U.S. Navy	U.S. Air Force	Special Operations Forces (SOF)
TACC TADC	BCD	TACC TADC	AOC	JSOAOC
TAOC	—	AWC	CRC	—
DASC	—	ASCS HCS	ASOC	SOCCE
FSCC	FSE A2C2	SACC	—	—
TACP	—	—	TACP	SOI F
FAC(A)	—	FAC(A)	FAC(A)	—
TAC(A)	—	TAC(A)	TAC(A)	—
FAC	—	—	FAC	SOTAC

Legend	
A2C2 = Army airspace command and control	FSE = fire support element
AOC = air operations center (USAF)	HCS = helicopter control section
ASCS = air support control section	SOCCE = special operations command and control element
AWC = air warfare commander	SOTAC = special operations terminal attack controller
CRC = control and reporting center	

request process. Joint CAS requests are forwarded to the JAOC for consideration and assignment. For example, if a MAGTF and an Army division are operating as adjacent units under a JFC, each

component would direct requests for joint CAS through its respective request process to the JAOC.

**Figure 2-4. Component Air Command and Control
Agency Functional Equivalents.**

Joint Communications Requirements

Aircrews performing joint CAS will use the communications nets and architecture of the supported component. To ensure that joint CAS is executed properly, all components involved must have the appropriate signal operating instruction (SOI)/communications-electronics operating instruction (CEOI) data to communicate effectively and successfully support requesting units. The joint force communications manager (J-6) must determine the standard SOI/CEOI information needed and ensure that it is provided to all components. It is the responsibility of the JFACC/JFC staff to ensure that required communications data for CAS is published in the joint ATO. It is the responsibility of component commanders to have and maintain the designated keymat for secure communications.

CAS-capable units, aircrews, terminal controllers, and air control agencies will need radio frequencies and call signs that are specific to joint CAS C2. CID means, such as identification, friend or foe (IFF) codes and authentication materials, will also be required. The MAGTF communications manager (S-6) should establish direct liaison with the joint force J-6 to coordinate the necessary CAS communications data needed to support the joint CAS process. See Joint Pub 3-09.3, *JTTP for Close Air Support (JCAS)*, for further information.